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Shanti Swarup Bhatnagar Prizes Presented

The Shanti Swarup Bhatnagar Prizes for the years 1974 and 1975 were presented to sixteen distinguished scientists at a function held at the National Physical Laboratory, New Delhi, on 6 April 1977 by Shri B. D. Jatti, Acting President of India.

Congratulating the awardees, the Acting President urged the scientific community to direct their energies "for the speedier realization of our national objectives".

Shri Jatti noted that the impact of our scientists' efforts in increasing agricultural output, industrial productivity, indigenization of sophisticated industries and establishment of new science-based industries has been considerable. But considering the size and complexity of problems facing the country, he said there was need for the increasing involvement of our scientists and technologists with every phase of our national life.

Referring to the efforts of the Council of Scientific and Industrial Research and a few other institutions in adopting backward districts for their allround, integrated development, the Acting President said that these efforts, though commendable, were only sporadic. They had to be multiplied several times to remedy the accumulated neglect of centuries. This has to be done in an organized manner and on a block by block and district by district basis, he added.

Speaking of the vast resources of our country, Shri Jatti said that he was aware of the serious concern of our scientists in exploring ways and means of deriving energy from non-conventional sources like sun, wind, and tidal waves. He hoped that an attempt would be made to evolve a rational policy for better utilization of our mineral resources, keeping in view our present and future requirement.

Earlier, in his welcome address, Shri P. N. Haksar, Vice President of CSIR, stressed the need for high science and technology to tackle the country's problems.

Prof. Y. Nayudamma, Director General, Scientific & Industrial Research, read out the citations which are reproduced below (one of the awardees — Prof. M. S. Sodha — was not present on the occasion).

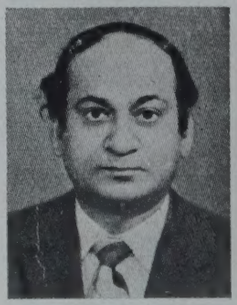
The Acting President, Shri B. D. Jatti, addressing the scientists; seated on the dais are *(from left)* Dr A. R. Verma, Director, NPL, Shri P. N. Haksar, Vice President of CSIR, and Prof. Y. Nayudamma, Director General, Scientific & Industrial Research

Citations

Prof. K. P. Sinha

The Shanti Swarup Bhatnagar Prize in Physical Sciences for the year 1974 has been given to Prof. K. P. Sinha, Senior Professor, Indian Institute of Science, Bangalore, jointly with Prof. M. S. Sodha, Department of Physics, Indian Institute of Technology, New Delhi.

Prof. Sinha has made outstanding contributions in theoretical solid state physics, particularly in crystal magnetism. His work has added considerably to our knowledge on the mechanism of exchange and other interactions in solids in relation to transport properties and the origin of giant moments, and also to excitonic and electronic

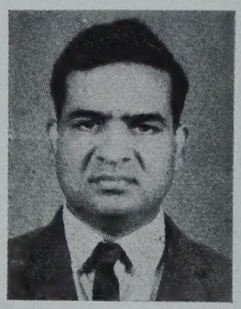


phase transitions in doped semiconductors. His proposal of the non-equilibrium mechanism with regard to high-temperature super conductivity has attracted considerable theoretical and experimental attention.

Prof. M. S. Sodha

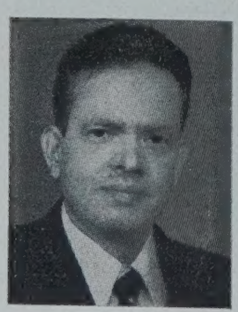
The Shanti Swarup Bhatnagar Prize in Physical Sciences for the year 1974 has been given to Prof. M. S. Sodha of the Department of Physics, Indian Institute of Technology, New Delhi, jointly with Prof. K. P. Sinha, Indian Institute of Science, Bangalore.

Prof. Sodha has made outstanding theoretical contributions in the broad area of interaction of fields with matter. His contribution to self-focussing in plasmas is significant with possibly important applications in laser fusion. Following a new approach, he has obtained interesting results on self-focussing in optical fibres which will be useful for optical communications. In the field of harmonic generation in plasmas and semiconductors, he has also made important theoretical contributions. His work on plasma has a bearing on magnetohydrodynamic (MHD) power generation.



Dr U. R. Ghatak

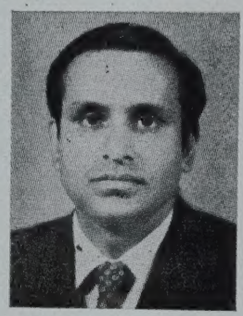
The Shanti Swarup Bhatnagar Prize in Chemical Sciences for the year 1974 has been given to Dr U. R. Ghatak of the Indian Association for the Cultivation of Science, Jadavpur, Calcutta, jointly with Dr K. Nagarajan, CIBA-GEIGY Research Centre, Bombay.



Dr Ghatak has made outstanding contributions to methods for stereoselective synthesis of diterpenoids. Dr Ghatak's work is marked by a deep understanding of conformation of organic molecules and steric factors which control bond formation in organic synthesis. His work on intramolecular C-alkylation reactions using ketocarbenoid or diazoketone intermediates is an important contribution to synthesis of gibberellin-like compounds, which are an important group of plant growth promoting factors.

Dr K. Nagarajan

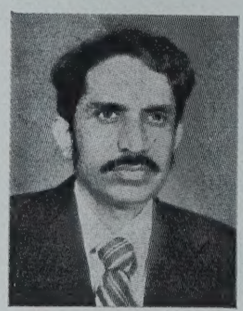
The Shanti Swarup Bhatnagar Prize in Chemical Sciences for the year 1974 has been given to Dr K. Nagarajan of CIBA-GEIGY Research Centre, Bombay, jointly with Dr U. R. Ghatak of the Indian Association for the Cultivation of Science, Jadavpur, Calcutta.



Dr Nagarajan has made outstanding contributions to the synthesis of new heterocyclic systems and to structural elucidation of novel natural products. His work is marked by a deep understanding of reaction mechanisms and conformation of organic molecules. His novel synthesis of dibenzoxazepines has resulted in the development of a new antidepressant drug.

Prof. John Barnabas

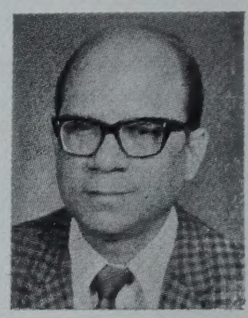
The Shanti Swarup Bhatnagar Prize in Biological Sciences for the year 1974 has been given to Prof. John Barnabas of Ahmednagar College, Ahmednagar.



Prof. Barnabas has made outstanding contributions in the field of evolutionary genetics through his studies on the sequences of amino acids in haemoglobin of mammals. His work has contributed to a deeper understanding of evolution. Prof. Barnabas has developed methods which make it possible to use molecular structure to measure evolutionary distance as well as rates of evolutionary change. His work is marked by experimental ingenuity and incisiveness.

Prof. M. A. Pai

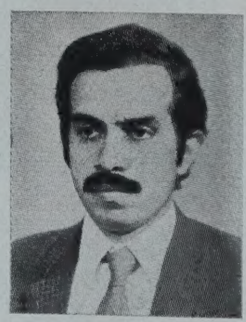
The Shanti Swarup Bhatnagar Prize in Engineering for the year 1974 has been given to Prof. M. A. Pai, Professor of Electrical Engineering, Indian Institute of Technology, Kanpur, jointly with Dr R. Narasimha, Department of Aeronautical Engineering, Indian Institute of Science, Bangalore.



Prof. Pai is nationally and internationally recognized for his contribution in the area of power system stability, large-scale power system analysis, system security and optimal control of nuclear reactors. He has also developed power system software which will be of direct use to most of the electricity boards. The most significant contribution of Prof. Pai has been in industrial consultations. In this area of work, he has been actively associated with state electricity boards, and leading private and public sector undertakings.

Dr R. Narasimha

The Shanti Swarup Bhatnagar Prize in Engineering for the year 1974 has been given to Dr R. Narasimha of the Department of Aeronautical Engineering, Indian Institute of Science, Bangalore, jointly with Prof. M. A. Pai, Professor of Electrical Engineering, Indian Institute of Technology, Kanpur.



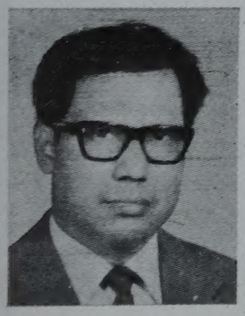
Dr Narasimha, who has had a distinguished academic career, is well known

for his outstanding contribution in the broad field of fluid mechanics. In particular, his contributions to turbulence, boundary layers and rarefied gas dynamics have opened new horizons and helped in obtaining a better understanding of these phenomena. His main forte is to extract simple physical models from complex engineering problems and apply sophisticated mathematical tools to obtain a better understanding of them. It is this versatility that sets him apart from others practising in the engineering disciplines.

As examples of his versatility, one may cite his studies related to satellite vehicles applying rarefied gas dynamics theories, statistical analysis of the relationship between performance and maintenance of aircraft, studies related to flow-induced oscillations in nuclear reactor calandria, and the structure of turbulent and transitional fluid flows.

Prof. B. R. Nag

The Shanti Swarup Bhatnagar Prize in Physical Sciences for the year 1975 has been given to Prof. B. R. Nag of the Centre of Advanced Studies in Physics and Electronics, Calcutta University, Calcutta, jointly with Prof. K. L. Chopra, Department of Physics, Indian Institute of Technology, New Delhi.



Prof. Nag has done outstanding work in electrical transport phenomena in semiconductors. He has also contributed to the understanding of miniband parameters of semiconductor superlattices and magnetic quantization in non-parabolic energy bands. These studies have a bearing on microwave semiconductor devices, which are important in microwave communications and radar.

Prof. K. L. Chopra

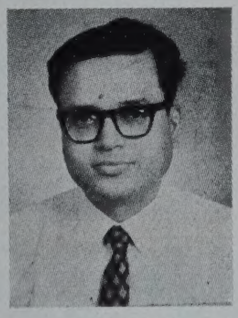
The Shanti Swarup Bhatnagar Prize in Physical Sciences for the year 1975 has been given to Prof. K. L. Chopra of the Department of Physics, Indian Institute of Technology, New Delhi, jointly with Prof. B. R. Nag, Centre of Advanced Studies in Physics and Electronics, Calcutta University, Calcutta.

Prof. Chopra has made outstanding contributions to the understanding of the structure and growth of thin films, and the electron transport processes in crystalline and amorphous films of metals and semiconductors with particular emphasis on the effect of geometrical scattering, structural defects, and spatial and electronic disorder. He has developed novel techniques for growing thin films with special properties and useful applications which are being adopted by the industry.

Prof. A. Chakravorty

The Shanti Swarup Bhatnagar Prize in Chemical Sciences for the year 1975 has been given to Prof. A. Chakravorty of the Department of Chemistry, Indian Institute of Technology, Kanpur, jointly with Dr D. S. Bhakuni of the Central Drug Research Institute, Lucknow.

Prof. Chakravorty is a leading research worker in modern structural coordination chemistry. He has made outstanding contribution to this area through a number of publications and reviews. He has effectively employed a variety of modern physical methods like NMR spectroscopy, optical spectroscopy, and magnetic measurements to solve several difficult problems. His work on paramagnetic contact shifts is well recognized. Under the broad heading of stereochemical phenomena, Prof. Chakravorty has investigated anomalous isomorphism, halo-coordination, pentacoordination and polytopal equilibria. Special mention should be made of Prof. Chakravorty's contributions to magnetic exchange in coordination compounds.

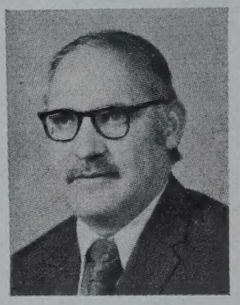


Prof. Chakravorty has recently initiated research in the area of redox reaction employing rapid sweep voltametry.

Dr D. S. Bhakuni

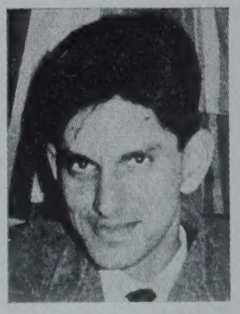
The Shanti Swarup Bhatnagar Prize in Chemical Sciences for the year 1975 has been given to Dr D. S. Bhakuni of the Central Drug Research Institute, Lucknow, jointly with Prof. A. Chakravorty, Indian Institute of Technology, Kanpur.

Dr Bhakuni has made significant contributions to several aspects of natural product chemistry. He has systematically examined a large number of indigenous plants for biologically active compounds, determined their structure and stereochemistry and also synthesized them. His studies have uncovered biological activity in a number of new natural products. Special mention may be made of his work on biogenesis of alkaloids in which field he has been one of the pioneers in the country.



Prof. Obaid Siddiqi

The Shanti Swarup Bhatnagar Prize in Biological Sciences for the year 1975 has been given to Prof. Obaid Siddiqi, Professor of Molecular Biology, Tata Institute of Fundamental Research, Bombay, jointly with Prof. (Mrs) Archana Sharma, Professor of Cytogenetics, Department of Botany, Calcutta University, Calcutta.



Prof. Siddiqi has made outstanding contributions in molecular biology with special reference to transfer and recombination of DNA in microorganisms and genetic regulation of protein synthesis. His incisive studies have clarified the relationship between DNA replication and recombination.

Prof. (Mrs) Archana Sharma

The Shanti Swarup Bhatnagar Prize in Biological Sciences for the year 1975 has been given to Prof. (Mrs) Archana Sharma, Professor of Cytogenetics, Department of Botany, Calcutta University, Calcutta, jointly with Prof. Obaid Siddiqi, Professor of Molecular Biology, Tata Institute of Fundamental Research, Bombay.

Prof. (Mrs) Sharma is distinguished for her work on chromosomes of plant and human systems, with special reference to differentiation and mechanisms of evolution. Her contributions in developing new techniques for studies of chromosomes have made significant impact in the field of plant and human genetics.

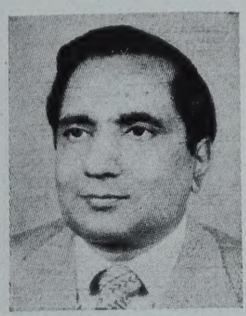
Prof. U. R. Rao

The Shanti Swarup Bhatnagar Prize in Engineering Sciences for the year 1975 has been given to Prof. U. R. Rao, Director, ISRO Satellite Centre, Bangalore.

Prof. Rao's principal contribution lies in satellite technology. To him goes the credit for systems engineering from conception to design, fabrication and operational phase of the satellite system. He was the chief architect of India's first satellite Aryabhata. The technological spinoffs of this system will enable the development of more sophisticated spacecraft systems for national development in the coming decades.

Prof. P. C. Jain

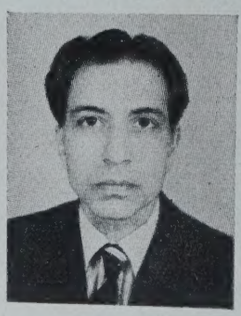
The Shanti Swarup Bhatnagar Prize in Mathematical Sciences for the year 1975 has been given to Prof. P. C. Jain, Professor of Mathematics, Indian Institute of Technology Bombay, jointly with Prof. M. S. Narasimhan, Tata Institute of Fundamental Research, Bombay.



Prof. Jain's significant contributions are in the development of algorithms of far-reaching importance for solving nonlinear problems involving irregular boundaries. Algorithms based on finite difference technique, finite element technique and quasilinearization and invariant embedding have been developed and applied to various problems in fluid dynamics. These techniques have not only added to our present knowledge of fluid dynamics and its applications but they hold promise of enabling applied mathematicians and scientists to solve still more difficult, highly non-linear problems in the near future. His contributions are likely to have a significant impact on the solution of problems of stability and turbulence in fluid dynamics, numerical weather forecasting and magnetohydrodynamic power generation.

Prof. M. S. Narasimhan

The Shanti Swarup Bhatnagar Prize in Mathematical Sciences for the year 1975 has been given to Prof. M. S. Narasimhan, Professor of Mathematics, Tata Institute of Fundamental Research, Bombay, jointly with Prof. P. C. Jain, Professor of Mathematics, Indian Institute of Technology, Bombay.



Prof. Narasimhan has made significant contributions to important fields such as differential equations, differential geometry and algebraic geometry. Working jointly with Dr C.S. Seshadri he gave a characterization of stable vector bundles on an algebraic curve in terms of unitary representation of certain discrete groups. More recently, in a joint study of the moduli varieties of these vector bundles with S. Ramanan, he has determined the singularities of these varieties and in the case of low ranks, their de-singularization. Apart from relating the moduli of these varieties with moduli of the curve, he has contributed to the study of their cohomology.

Meeting on Scanning Electron Microscopy

The Ahmedabad Textile Industry's Research Association (ATIRA), Ahmedabad, organized, on 14 March 1977, a meeting on scanning electron microscopy with a view to publicizing among the various research workers in Ahmedabad the scanning electron microscopy facilities at ATIRA and introducing to them the different techniques and applications so that they could make use of the instrument in their diverse research programmes.

The meeting, in the form of a seminar, started with a welcome address by Dr P.C. Mehta, Director, ATIRA, who also informed the gathering that the instrument was received with assistance from the United Nations Development Programme. This was followed by three technical lectures on 'The scanning electron microscope' by Dr J. T. Sparrow, UNDP expert; 'Techniques of sample preparation' by Dr U.M. Raval, Department of Zoology, Gujarat University; and 'Applications of the SEM in biomedical research' by Dr A. B. Vyas, Department of Zoology, Gujarat University. This was followed by a practical demonstration of samples on the scanning electron microscope for the benefit of the visitors.

Twenty-three active research scientists from widely different fields parti-

cipated in the meeting at which the participants and the research staff of ATIRA took part. The meeting aroused a great deal of interest in the field.

Eastern India Science Camp at BITM

The 1977 Eastern India Science Camp was organized at the Birla Industrial & Technological Museum (BITM), Calcutta, from 20 to 28 February 1977 in collaboration with the Education Directorates of the Eastern States; the Nehru Yuvak Kendra, Government of India; and the Department of Youth Services, Government of West Bengal. Students from the states of Arunachal Pradesh, Assam, Bihar, Meghalaya, Mizoram, Nagaland, Orissa, Tripura and West Bengal participated in this camp.

The science camp programme included, among other things, the following important activities: (1) An inter-state science exhibition in which 524 students from 152 schools and science clubs took part with 400 scientific models and projects. A good number of selected models from 13 regional science fairs organized prior to this camp during February 1977 were also exhibited here. The participants demonstrated their own models and projects to the visitors; (2) Work experience camps where students were engaged in carrying out different projects under the expert guidance of eminent scientists and technicians. In all, 7 such camps were set up and these covered pottery, photography, hand-made paper-making, geology, electronics, aeromodelling, and architectural model-making; and (3) Popular lectures on 'The mysteries of the universe' and 'Wild life of Zaire'.

The science camp drew more than 27,000 visitors including students and teachers.

With a view to encouraging the participants, 7 scholarships including 6 CSIR scholarships, 40 prizes and 3 challenge trophies were awarded to the winners.

Some of the important models and exhibits exhibited in the science camp were: machine for making puffed rice, distillation of tar, cottage industry of tassar, digital calculator, 'pani chakki', automatic security arrangement, rhythm synthesizer, automatic headlight control, electric train, earthquake alarm, electric printing press, and sugar from molasses.

During February 1977, 13 district science fairs were also organized by BITM in collaboration with the Nehru Yuvak Kendra, Government of India; and the Department of Youth Services, Government of West Bengal. The fairs were held in Bankura, Burdwan, Birbhum, 24 Parganas (South), 24 Parganas (North), Midnapore, Howrah, Hooghly, Murshidabad, Nadia, Purulia, Malda and Jalpaiguri districts.

Silver Paste for Mica Capacitors

The National Chemical Laboratory (NCL), Poona, has developed a process for the production of silver paste for mica capacitor electrodes. Mica capacitors find extensive applications in electronic circuits of radio and television receivers, amplifiers and in communication systems.

In the NCL process, silver powder of required particle size and shape is intimately mixed with a low-softening glass. This mixture is then processed with a highly viscous organic binder to give a paste with paint-like consistency.

The paste has been tested by a party which makes mica capacitor electrodes and has been found acceptable. At present, the country's requirements of about 2 tonnes worth around Rs 36 lakh are met entirely by imports.

The process will shortly be available for release to industry.

Multipurpose Electrical Simulator

A multipurpose electrical simulator which provides an answer to complex testing of electrical equipment has been designed and fabricated by the National Aeronautical Laboratory (NAL), Bangalore. This is a go/no-go testing facility for various electrical components. The heart of the simulator is a three-phase motor-driven transformer which is controlled by push buttons provided on the control panel.

In a sense, the simulator is a power source and has the following broad specifications:

Three-phase, 50 Hz, 0-470 V, 28 A
Single phase, 50 Hz, 0-700 V, 5 kVA
(secondary isolated from ground)
dc, 0-400 V, 10 A (ripple less than 2%)
Single phase, 50 Hz, 0-5 kV, 50 mA
dc, 0-5 kV, 30 mA
Single phase, 50 Hz, 0-10 V, 500 A

By using the simulator it is possible to test components like solenoid valves, electromagnets, saturable reactors, magnetic amplifiers, leakage current of low-voltage high-current semiconductor rectifiers, forward voltage drops in high-voltage selenium rectifiers, ac/dc breakdown test of insulation sheets, electromagnetic contactors, and thermal overload relays. The unit also forms a convenient source for testing and calibration of industrial-grade meters (panel meters and portable meters), ac/dc ammeters, voltmeters, wattmeters, power factor meters, energy meters, etc.

For testing high-power wattmeters and energy meters, conventional loading methods are impracticable. In this simulator the well-known phantom loading is provided, thus making it possible to test high-power meters.

Stress Problem of Elliptic Holes and Inclusions and Straight Line Cracks in Cylindrical Shells

Openings are invariably necessary in shell structures like pressure vessels, high-pressure ducts and aircraft fuselages for a variety of functional requirements such as inspection, branch connections and visibility. Shri M. V. V. Murthy of the National Aeronautical Laboratory, Bangalore, worked on the stress problem of elliptic holes and inclusions and straight line cracks in cylindrical shells and was admitted to

the Ph.D. degree of the Indian Institute of Science, Bangalore, in December 1976. Shri Murthy's work was concerned with the specific case of elliptic openings which should be most favoured in biaxial states for keeping down the stress concentration levels. His Ph.D. work was based essentially on a continuum type of analysis. For holes of relatively small size, simple closed-form solutions were developed and from these solutions stresses could be readily calculated. For holes of large size, an analytical-cum-numerical type of analysis was carried out, and charts from which stress concentration factors could be directly read off were presented. A significant contribution in the thesis was the analysis of the limiting case of cracks. The method of analysis used was new and was much simpler than the integral equation approach so far used for the problem of cracks in shells.

PROCESSES AND PRODUCTS READY FOR COMMERCIAL UTILIZATION

Solid State Constant Temperature Anemometer for Fluid Flow Studies*

Anemometers are used for measuring the velocity of fluids. The most common are the cup type, deflecting vane type and hot wire type. The cup anemometers are not accurate for measuring flow rate or flow quantity because of the large number of variables affecting calibration. The deflecting vane anemometers operate by allowing a jet of air or gas to impinge directly on a pivoted vane and are used for measuring duct velocities in ventilating and air-conditioning work. The hot wire anemometer consists of a small resistance wire inserted in the fluid stream and heated by electric current. There are three methods of determining the velocity of flow. First, the temperature of the wire can be maintained constant by adjusting the current flow through the wire and the velocity of flow is then proportional to the current through the resistance wire. Second, the temperature difference in the flowing fluid before and after the resistance element can be maintained constant by adjusting the current flow through the element. The velocity of flow is then proportional to the current flowing through the element. Third, the current in the resistance wire can be maintained constant, and the temperature, and therefore the resistance, of the wire is measured.

The National Aeronautical Laboratory (NAL), Bangalore, has developed a solid state constant temperature anemometer for fluid flow studies in wind tunnels.

The work has been done up to prototype stage and a unit has been supplied to the Vikram Sarabhai Space Centre, Trivandrum, at their special request. The instrument has been tested and its performance has been found satisfactory. The device consists of a sensor, a hot wire or hot film, which is held submerged in the flow to be measured and is arranged to be in one arm of a wheatstone bridge circuit, other arms of which are standard resistances. This sensor is maintained at constant resistance, and hence constant temperature, by a feedback circuit which, based on the signal across diagonal points of the bridge circuit, controls the bridge supply voltage to keep the bridge in perfect balance irrespective of changes imposed by the flow on the heat loss from the sensor. Supply voltage then becomes a measure of flow parameters past the sensor. A zero suppressor incorporated in the system allows suppression of bridge supply voltage value at no flow conditions and increases the accuracy of bridge voltage readings, thus enhancing the resolution of the system for a given panel meter. A square wave generator provided in the instrument may be used for determining the frequency response of anemometer system and sensor.

The specifications of the anemometer developed at NAL are as follows:

Type	: all solid state circuiting
Mode of operation	: constant temperature mode
Probes	: hot wire or hot film
Resistance range	: 0-10 ohms nominal
Control resistor	: variable decade built-in
Frequency range	: dc to 50 kHz
Bridge output	
Range	: 0 to 10 V
Impedance	: 100 ohms
Noise level	: 0.02% of output
Accuracy	: better than ± 2% nominal on readout
Zero suppressor	: continuous type control to subtract a precise voltage from the anemometer output
Square-wave test	: built-in square-wave generator switch to select any frequency in the range 0.3, 1, 3, 10, 30 kHz
Filters : high pass	: dc 1, 2.5, 10, 20, 50, 100, 200, 500, 1000 Hz (3 dB) and filter roll off 6 dB/octave
low pass	: 0.2, 0.5, 1, 2, 5, 10, 25, 50, 100, 200 kHz (−3 dB) and filter roll off 6 dB/octave
Power supply	: 230 V, 50 Hz

These instruments are used in a variety of fluid flow studies including mean and fluctuating flows, ventilation studies, atmospheric turbulence, skin friction measurement and other hydrodynamic and fluid mechanic studies.

The annual estimated demand for the anemometer is about 50 pieces.

The main components required are integrated circuits, zener diodes, transistors, diodes, potentiometers, resistors, condensers, knobs, bands and toggle switches, connectors and sockets. All the components except integrated circuits are available indigenously.

The main equipment required are ac/dc millivoltmeter, 10 MHz angle beam oscilloscope, multimeter and soldering iron. All these are available indigenously.

* This write-up replaces the one published in *CSIR News*, **27** (1977), 15, which was erroneous. The error is regretted.

Because of relatively low turnover it is necessary that the project should be taken up only by those firms which have the background, experience and standing in the production of electronic instruments. Secondly, the firms should have facilities to calibrate the instrument in wind tunnel for measurement studies.

The capacity of an economically viable unit as suggested by NAL is 20 anemometers per annum. The fixed capital on plant and the working capital are estimated at Rs 16,000 and Rs 25,000 respectively. The estimated cost of production would be Rs 4000 per unit.

Further particulars can be had from: The Managing Director, National Research Development Corporation of India, 61 Ring Road, Lajpat Nagar III, New Delhi 110024.

Mobility Aid for Blind

The National Physical Laboratory (NPL), New Delhi, has developed a device which helps in the mobility of the visually handicapped through the sense of hearing. Essentially the device sends ultrasonic waves of sweeping frequency that bounce back due to reflection from an obstacle. The reflected beam is picked up and after heterodyning with the transmitter signal, the resulting difference frequency is conveyed to the ears through earphone. For stationary objects, the pips have a constant pitch/frequency proportional to the distance of the obstacle.

The aid can detect an obstacle within 12-14 ft. Without an obstacle no sound is heard in the earphone, except a faint backdrop. As an obstacle is encountered, loud and clear tones are heard which change in frequency as the distance is altered. The weight of the unit (torch-shaped transistorized aid) is less than one kilogram and dimensions are 11 in. × 3½ in. × 1½ in. The device is also available in a more handy compact configuration (hybrid IC model) with reduced circuits of 6 in. × 3 in. × 2 in. size and of 500 g weight. The device is actuated by three cells of 9 V each. The prototypes have been tested and their performance has been found satisfactory.

The device is very useful in helping the blind to walk about easily. Objects like buildings, doors, trees, bushes, railings, poles and human beings can be easily detected. Even large discontinuities on the ground, such as a ditch, can be discerned by the sudden absence of sound. Sudden and swift movements of the obstacle produces another distinctive pattern and the edge of a road running by the side can be easily identified. Low-lying objects are also discernible.

The exact demand for this device has not yet been estimated. At present, about 60,000 people become blind every year. The device would cater to a sizable number of blinds who are mobile and are not mentally retarded. At present this device is not available indigenously.

The main raw materials required are polymers, electronic components and plastic sheets. All these are available indigenously.

As no special plant and machinery are required for the fabrication of this device, it is suggested that the process should be taken up by those firms which manufacture allied items. Special quality control procedure and facilities are required for ultrasonic and sound pressure level measurements.

The main equipment required are oscilloscope, signal generator, vacuum tube voltmeter, calibrated microphones and microphone amplifiers. All these are available indigenously.

The optimum plant capacity, as suggested by NPL, is 100 units/annum. The estimated fixed capital on equipment and the working capital are Rs 20,000 and Rs 15,000 respectively. The cost of production of a mobility aid has been estimated at Rs 600.

Further particulars can be had from: The Managing Director, National Research Development Corporation of India, 61 Ring Road, Lajpat Nagar III, New Delhi 110024.

Vapour Phase Corrosion Inhibitor Coated Papers

Ferrous items and engineering stores like components of bicycles, sewing machines, typewriters, automobiles, refrigerators, small arms, bolts, nuts and screws can be protected from corrosion during transport and storage by the use of anti-corrosion packaging papers. Anti-corrosion packaging papers are produced by coating or impregnating packing materials like kraft paper, waxed kraft paper and butter paper with vapour phase corrosion inhibitor. The items to be protected from corrosion during storage and transit are wrapped in such papers and placed inside cartons. As long as the package is kept enclosed and gross wetting of the package avoided, protection from corrosion is assured. Packaging cases can also be lined with such papers. The Central Electrochemical Research Institute, Karaikudi, has developed anti-corrosion packaging papers based on chemicals which can be readily obtained as these are byproducts of coke oven plants. The vapour phase corrosion inhibitors and the coated papers are much cheaper than the corresponding imported products and have been found to be equally good in performance under conditions of high humidity and temperature. Favourable reports on the performance of the inhibitors have been obtained by the manufacturers of wood screws in Tamil Nadu, by a manufacturer of automobile parts in Delhi and by the Inspectorate of Small Arms, Ichapur.

The capital investment for a plant capable of producing 2000 m^2/day (8 hr) has been estimated at Rs 2.6 lakh and the cost of production works out to 90 paise/m^2.

Further particulars can be had from: The Managing Director, National Research Development Corporation of India, 61 Ring Road, Lajpat Nagar III, New Delhi 110024.

PATENTS FILED

13/Del/77: Preparation of high-purity graphites, K. S. Narasimhan & P. K. Jena—RRL, Bhubaneswar.

14/Del/77: Improvements in or relating to the electrodeposition of bright iron-nickel alloys, B. A. Shenoi, (Mrs) M. Pushpavanam & (Mrs) R. Vidyalakshmi—CECRI, Karaikudi.

30/Del/77: Improvements in or relating to breath alcohol analyzers for detecting alcohol in breath, R. S. Khandpur & H. Vardhan—CSIO, Chandigarh.

31/Del/77: A piezoelectric micrometer, V. N. Bindal & M. Chandra—NPL, New Delhi.

PERSONNEL NEWS

Appointments/Promotions

Dr P. M. Nair of the National Chemical Laboratory, Poona, has been promoted from Scientist EI to Scientist EII (17 Dec. 1975).

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Dr R. Rangarajan has been appointed Scientist C at the Central Salt & Marine Chemicals Research Institute, Bhavnagar (23 Feb. 1977).

Honours

Dr S. L. Kapur, Scientist F and head of the Polymer Chemistry Division of the National Chemical Laboratory, Poona, received the Dr K. G. Naik gold medal for the year 1975. The medal is awarded annually to a scientific research worker in India in the field of chemistry whose published research contributions during the five years preceding the award have found or are most likely to find application in developing Indian industries.

Dr Kapur received the gold medal at a special function held at the M. S. University of Baroda on 3 February 1977.

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Shri I. N. Sengupta, Scientist-in-charge, Library & Documentation, Indian Institute of Experimental Medicine (IIEM), Calcutta, has been invited to be one of the permanent referees and associate editors for *Scientometrics* to be published by the Hungarian Academy of Sciences in collaboration with Elsevier-Sequoia.

Retirements

Dr N. L. Dutta, Scientist E II, IIEM, Calcutta, retired (31 Dec. 1976).

Transfers

Shri M. Gupta, Accounts Officer of the Central Fuel Research Institute, Dhanbad, has, on transfer, joined the Central Mining Research Station, Dhanbad (15 Feb. 1977).

COUNCIL OF SCIENTIFIC & INDUSTRIAL RESEARCH

Advertisement No. 9/77

It is proposed to appoint a Scientist F (Deputy Director) for the Central Building Research Institute, Roorkee.

Job Requirements : Should conduct and organize research in a field connected with buildings and help in the evaluation of research programmes in the laboratory as well as developmental and pilot projects, transfer of techniques from the laboratory to industry and the field.

Qualifications : High academic qualifications in civil engineering and considerable research experience in civil engineering or allied fields. Scientists/technologists who have high academic qualifications in other branches of science and have worked in subjects related to building construction and building materials industry will also be considered. Proven ability in guiding research and research management and experience of planning and execution of development and engineering projects are desirable.

Salary/Conditions of Service : The salary scale attached to the post is Rs 2000-125/2-2500. Initial pay will be fixed according to merits. The person selected will be appointed on contract for a period of six years, which would be confirmed after an initial period of two years of satisfactory service. Other conditions of contract will be supplied on request.

Age Limit : Below 50 years, relaxable in special cases.

Scientists/technologists interested may obtain a standard proforma for sending their *curriculum vitae* from the Chief (Administration), Council of Scientific and Industrial Research, Rafi Marg, New Delhi 110001. They can also obtain a brochure on the aims and objects and the latest annual report of the laboratory. Completed *curriculum vitae* proforma must be received in this office on or before 11 May 1977.

Advertisement No. 11/77

It is proposed to appoint a Director to head the Central Mechanical Engineering Research Institute, Durgapur.

Job Requirements : It is a top research management post in the field of mechanical engineering. The Director is required to provide high-level leadership in the formulation and guidance of R & D programmes and projects in the field of mechanical engineering relevant to the needs and priorities of industry, organizing and coordinating team work and ensuring commercial utilization by industry of the results of research. He will have the overall responsibility for the work of the institute for creating an atmosphere conducive to creative research and to win the confidence of the industry. The main function of the institute is to provide R & D backing to the mechanical engineering industries. The Director is a director of research, an able administrator and an image builder to the institute.

Qualifications/Experience : High academic qualifications or equivalent fellowship/membership of recognized professional bodies in mechanical engineering or in a related area with extensive experience in research, design and/or development work in one or more aspects of mechanical engineering. Candidates should have experience in industry besides industrial R & D experience, and management ability consistent with fulfilment of the job requirements specified above.

Salary/Conditions of Service : The salary scale attached to the post is Rs 2500-125/2-3000. Initial pay will be fixed according to merit. It is a tenure post. The person selected will be appointed on contract for a period of six years subject to confirmation of the contract after two years of satisfactory service. Other conditions of the contract will be supplied on request.

Age Limit : Below 50 years, relaxable in special cases.

There is no standard application form prescribed as such. Engineers/technologists interested may obtain a standard proforma for sending their *curriculum vitae* from the Chief (Administration), Council of Scientific and Industrial Research, Rafi Marg, New Delhi 110 001. They can also obtain a brochure on the aims and objects and the latest annual report of the institute. Applications along with completed *curriculum vitae* proforma must reach this office on or before 7 June 1977.

Canvassing in any form and/or bringing in any influence, political or otherwise, will be treated as a disqualification for the post.

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